REVIEW OF RESEARCH
ISSN: 2249-894X
IMPACT FACTOR : 5.7631(UIF)
VOLUME - 12 | ISSUE - 11 | AUGUST - 2023

PRODUCTION AND QUALITY OF CARROT (*DAUCUS CAROTA VAR. SATIVUS*) SEED AS INFLUENCED BY DIFFERENT METHOD AND TIME OF SOWING ON DIFFERENT VARIETIES

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ABSTRACT

A field experiment was conducted at the Research Farm-Department of Agricultural Science, Shridhar University, Pilani (Rajasthan) during the period from October, 2021 to November, 2022. The experiment was laid out in Randomized Complete Block Design (RCBD) with four replications. The production methods showed significant influence on most of the parameters. The maximum seed yields (19.61 g/plant and 3137.93 kg/ha) were obtained from Stacking method and the highest plant height (109.26 cm) was also observed from the same. Sequential germination test of both Pusa Kesar and Pusa Meghali varieties showed that the percentage of germination was decreased with the passing of time from harvesting to next seed sowing time. Considering the combined effect the variety Pusa Kesar with 3 January planting time and Stacking method showed the highest seed yield under the field condition.

KEY WORDS: *Carrot, Seed yield, Sketching method, germination test, planting time.*

INTRODUCTION

The carrot (*Daucus carota var. sativus*) is a member of the family Apiaceae (Peirce, 1987) and considered to be native of Mediterranean region (Shinohara, 1984) and its cultivation as a crop also began in that region. Carrot is one of the most ancient vegetables grown all over the temperate regions in spring, summer and autumn but in tropical and sub-tropical countries, carrots are produced during winter. Time of planting is an important factor for the quality carrot seed production (Srivastava *et al.,* 1976). The proper planting time depends on the existing cropping pattern and prevailing environment. It is the key factor for successful carrot seed production. Carrot is a biennial crop and its seed production is greatly influenced by temperature (Bose and Some, 1986). It requires adequate periods of cool temperature (vernalization) for flowering and seed production. Carrots should have sufficient vegetative growth prior to cool temperature exposure as vernalization successfully induces flower formation. Early planting causes winter killing or late season pest infestations. Planting too late results in a lack of vernalization, this limits flowering and thus reduces seed yield. Growers tend to manipulate planting time in order to obtain better growth, more flower formation and finally higher production of quality seed. Carrot seeds are produced in two ways (i) “seed-to-seed” method (plants raised in-situ) and (ii) “root-to-seed” method. Planting biennial seed, allowing the resulting plant without being

transplanted, does "Seed-to-seed" method. It does not permit selection or rouging of root or other genotypic characters. A majority of the carrot seed is produced by this method which is less expensive and simple. This method is the commonly employed procedure in the seed trade. On the other hand the highest seed yields of carrot are obtained from the closely spaced plants by root to seed procedure (Malik et al., 1988; Sharma and Singh, 1981).

METHOD AND MATERIALS

The present research work was conducted at the Research Farm, Department of Agricultural Science, Shridhar University, Pilani (Rajasthan) during the period from October, 2021 to November, 2022. The three-factor experiment was laid out in the randomized complete block design (RCBD) with four replications. Each block was divided into twelve unit plots each measuring 1.0 m × 1.0 m. The block to block and plot to plot distances were 1 m and 50 cm respectively. In each block twelve treatments were placed randomly. Thus there were 48 (12×4) unit plots altogether in the experiment. Five sample plants were selected randomly from each unit plot and data were recorded on individual plant basis from the selected plants in respect of the following characters. The plants in the outer rows and at the extreme end of the middle rows were excluded from the random selection to avoid the border effect. The data collected from the experimental plots were statistically analysed. The mean values of all treatments were calculated and the analysis of variance for most of the characters was accomplished by F variance test. The significance of difference among the treatment means was evaluated by least significant difference (LSD) test at 5% and 1% levels of probability (Gomez and Gomez, 1984).

RESULTS AND DISCUSSION

The experiment was laid out in a Randomized Complete Block Design (RCBD) with four replications. Two varieties viz. Pusa Kesar and Pusa Meghali and two production method viz., direct method and stacking method comprised 12 treatment combinations. In this experiment data were collected on the following parameters: plant height (cm), days to 50% flowering, days to 50% fruit set, days required from flowering to fruit set, number of single umbels per compound umbel, number of flowers per single umbel, number of primary umbels, number of secondary umbels, diameter of primary umbel (cm), diameter of secondary umbel (cm), seed yield of primary umbel (g), seed yield of secondary umbel (g), seed yield per plant (g), seed yield per plot (g), seed yield per hectare (kg), weight of 1000 seeds and germination percentages of seeds from July to November, 2022.The maximum plant height (109.26 cm) was obtained from Stacking method and the minimum (100.02 cm) was from the direct method. The longer time (144.50 days) required to complete 50% flowering was found with the direct method and the shorter (143.67 days) was required with Stacking method. The longer time required (157.17 days) to complete 50% fruit set was found with Stacking method and the shorter (157.11 days) was with direct method. The longer time (13.67 days) was found in Stacking method and the shorter (12.79 days) was from direct method for flowering to fruit set.

Table 1: Combined effect of variety and production method on plant height, days required to 50% flowering, fruit set and flowering to fruit set of carrot.

Variety x Production method	Plant height (cm)	Days required to 50% flowering	Days required to 50% fruit set	Days required to 50% flowering to fruit set
V1M1	98.34	144.92	157.33	12.50
V1M2	106.54	144.08	157.17	13.25
V2M1	101.71	144.08	156.88	13.08
V2M2	111.98	143.25	157.17	14.08
LSD (0.05)	0.356	-	0.167	0.018
LSD(0.01)	0.478	-	0.225	0.024
Level of sign	**	NS	**	**

Table 2: Combined effect of variety and production method on number of primary umbels, number of secondary umbels, number of single umbels per compound umbel, number of flowers per single umbel of carrot.

Variety x Production method No.	No. of primary umbels per plant	No. of secondary umbels per plant	No. of single umbels per compound umbel	No. of flowers per single umbel
V1M1	6.44	9.18	59.83	53.42
V1M2	8.08	10.25	68.08	44.75
V2M1	7.00	10.17	66.00	48.25
V2M2	8.10	11.17	74.67	45.33
LSD (0.05)	0.109	-	0.180	0.152
LSD(0.01)	0.146	-	0.241	0.204
Level of sign	**	NS	**	**

** = Significant at 1% level of probability
NS = Not-significant
M1 = Direct method
M2 = Stacking method
V1 = Pusa Kesar
V2 = Pusa Meghali

Table 3: Combined effect of variety and production method on seed yield of primary umbel, yield of secondary umbel, yield per plant, yield per plot, yield per hectare, weight of 1000 seeds and germination test of seeds from July to November 2022.

Variety x production method	Seed yield of primary umbel (g)	Seed yield of secondary umbel (g)	Seed yield per plant (g)	Seed yield per plot (g)	Seed yield (kg/ha)	Weight of 1000 seeds (g)	Seed germination (%)				
							July	Aug	Sept	Oct	Nov
V1M1	9.36	5.23	14.58	233.31	2333.07	1.61	80.29	78.83	78.17	77.33	75.67
V1M2	11.49	6.83	18.32	293.13	2931.33	1.70	87.17	81.33	79.58	79.33	78.00
V2M1	10.54	7.23	17.77	284.25	2842.53	1.73	82.25	79.75	78.00	77.42	76.75
V2M2	12.63	8.27	20.90	334.45	3344.53	1.80	89.50	84.37	81.75	80.50	80.50
LSD (0.05)	0.356	0 .109	0.079	0.180	0.152	-	0.271	0.167	0.180	0.152	0.132
LSD(0.01)	0.478	0.146	0.106	0.241	0.204	-	0.363	0.225	0.241	0.204	0.177
Level of sig.	*	**	**	**	**	NS	**	**	**	**	*

** = Significant at 1% level of probability
* =Significant at 5% level of probability
NS = Not significant
M1 = Direct method
M2 = Stacking method
V1 = Pusa Kesar
V2 = Pusa Meghali

The higher number of primary umbels (8.09) was obtained from Stacking method and the lower (6.72) was observed from direct method. The higher number of secondary umbels (10.71) was found from Stacking method and the lower (9.67) was from direct method. The higher number (71.38) of single umbels per compound umbel was observed with Stacking method and the lower (62.92) was

observed from direct method. The higher number (50.83) of flowers per single umbel was observed from direct method and the lower (45.04) was from Stacking method. The higher diameter (8.86 cm) of primary umbel was observed from Stacking method and the lower (8.75 cm) was observed from direct method. The higher diameter (5.02 cm) of secondary umbel was observed from Stacking method and the lower (4.83 cm) was from direct method. The higher (12.06 g) seed yield of primary umbel was found from Stacking method and the lower (9.95 g) was from direct method. The higher seed yield of secondary umbel (7.55 g) was obtained from Stacking method and the lower (6.23 g) was from direct method. The higher seed yield (19.61 gm) of plant was obtained from Stacking method and lower (16.17 gm) was from direct method. The higher (313.79 g) seed yield per plot was observed from Stacking method and lower (258.78 g) was from direct method. The higher seed yield per hectare (3137.93 kg) was found with Stacking method and the lower (2587.80 kg) was from direct method. The higher weight of thousand seeds (1.75 g) was found with Stacking method while it was the lower (1.67 g) from the direct method. The higher germination percentage (88.33%) was found in the seeds produced with Stacking method and the lower (81.27%) was with direct method.

CONCLUSION

The experiment may be repeated in other locations to make general recommendation for the successful yield and quality of carrot seed production.

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